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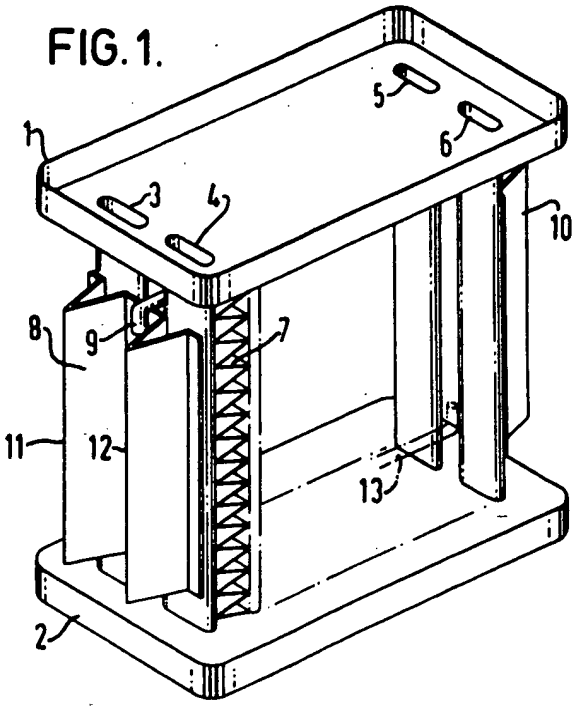
(71) Applicant
IMI Marston Radiator Services Limited
Sandhill Drive
Narborough,
Leicester LE9 5LQ
(72) Inventor
Alan Hooton
(74) Agents
J Christopher Sykes
Patents and Licensing Department
IMI Limited
P O Box 216
Birmingham B6 7BA

(54) Radiator core and method of assembly

(57) In a radiator core comprising tubes (e.g. 3–6) with corrugated elements 7 arranged between the tubes to act as heat transfer surfaces, each edge of the core along the lengths of the tubes is provided with a reinforcing sheet 8, 10, the sheets being held to the core by tie rods 9, 13 extending between said sheets. The invention also comprises a method of assembling the core. After assembly the core may be baked to bind the components together.

FIG. 1.



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The drawings originally filed were informal and the print here reproduced is taken from a later filed formal copy.

FIG.1.

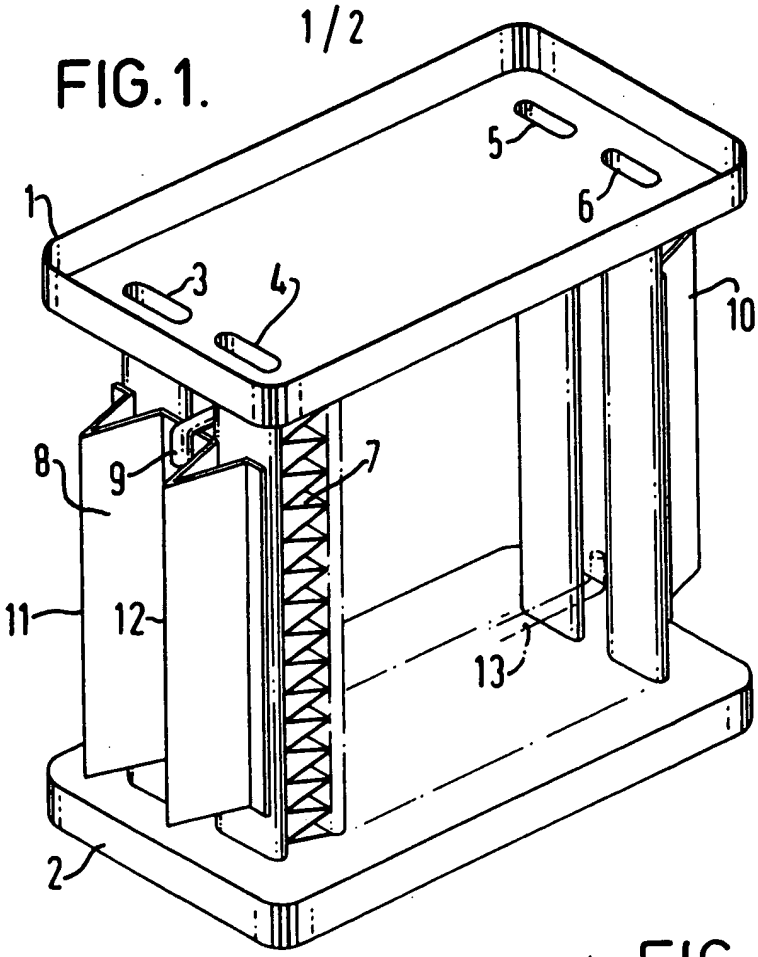

FIG.2.

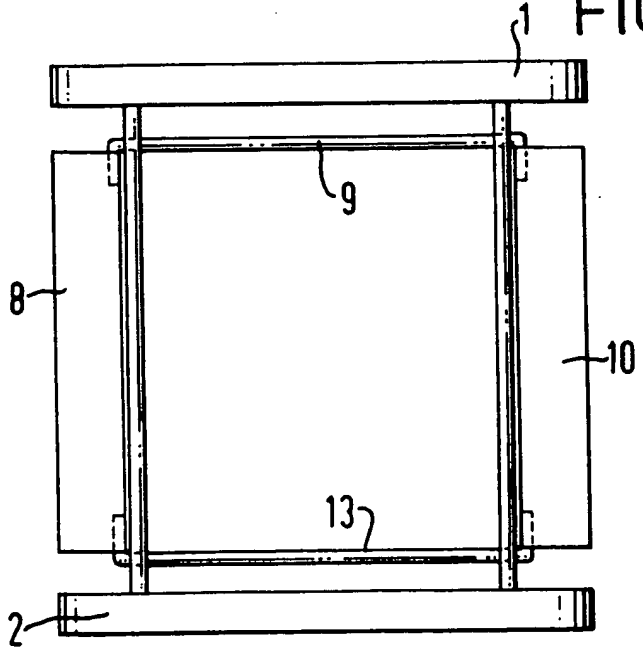

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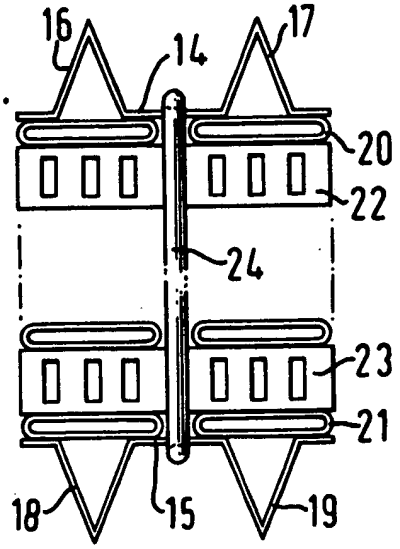
FIG. 3.



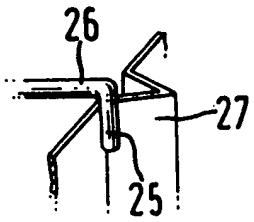


FIG. 4.

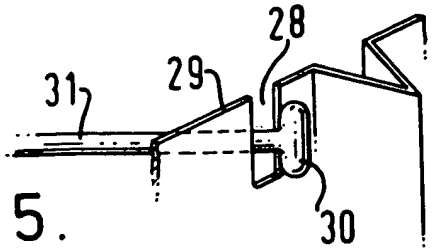


FIG. 5.

SPECIFICATION

Radiator core and method of assembly

This invention relates to radiators and has particular reference to radiator cores and their method of assembly.

The invention is concerned with radiator cores of the type comprising a plurality of tubes disposed between a pair of opposed header plates. Located in the spaces between the tubes are a series of corrugated airways which act as heat transfer surfaces for the air passed over the tubes. Coolant fluid, normally water, is passed between the header plates along the length of the tubes.

By the present invention there is provided a radiator core comprising a plurality of tubes spaced in substantially parallel arrangement, with the spaces between the tubes containing heat transfer surface airways, the edges of the core adjacent to the tubes each being provided with a reinforcing member, the reinforcing member comprising a sheet having a number of V cross-section channels, the apex of the channels being opposed to the core and a pair of steel rods of a general C-shape interconnecting each end of the opposed reinforcing members.

The present invention also provides a radiator core comprising a pair of opposed header plates, each header plate having disposed therebetween parallel rows of tubes extending into the header plates, a series of corrugated heat transfer airways located in the spaces between the tubes, and reinforcing members being provided at each side of the radiator core, each reinforcing member comprising a sheet of metal and being interconnected by steel rods extending between the sheets of metal. Preferably each of the tubes is substantially rectangular in cross-section. Preferably the steel rods are of generally C-shape with each wire rod being located between the gaps between the rows of tubes. Further preferably the reinforcing members have a number of V-shaped channels to strengthen the members.

The present invention further provides a method of assembling a heat exchanger core comprising placing a first reinforcing member in a jig, locating on the first reinforcing member a set of rectungular cross-section tubes, locating a secondary airway surface on the set of tubes, locating further tubes and airways as required to complete the width of the core, locating a final set of tubes on the upper secondary surface, locating a further reinforcing member on the upper set of tubes and interconnecting the reinforcing members by means of steel rods. The steel rods may be C-shaped and may be located between gaps in the tubes.

After being assembled, the core is preferably baked to hold its component parts together.

By way of example only, embodiments of the present invention will now be described with reference to the accompanying drawings, of which:

Figure 1 is a perspective view of a two row heat exchanger core in accordance with the present invention;

Figure 2 is a plan view of a two row heat exchanger core;

Figure 3 is a part sectional view of a core.

Figure 4 is a scrap view of part of the reinforcing member; and

Figure 5 is a scrap view of an alternative holding system.

Referring to Fig. 1 this shows a first header plate generally indicated by 1 and a second opposed header plate generally indicated by 2. Disposed between each of the header plates is a series of coolant tubes which are of generally rectangular section (although having rounded edges). The tubes are disposed in two rows 3 and 4. The tubes are arranged across the entire length of the header plate, although, for reasons of clarity, only the end tubes 3, 4 and 5, 6 are shown in the drawing. Disposed between each of the adjacent coolant tubes are corrugated airways such as the ones shown at 7. The tubes, airways and header plates are conventionally formed of copper bearing material and are baked together. Such radiator cores are of conventional manufacture and normally there would be provided a conventional header tank on each of the header plates. The header tanks are not shown. The features of the invention are shown in Fig. 1 as at 8 and 9. On each end of the core there is provided a reinforcing channel 8 at one end and 10 at the other. The reinforcing channels are held in situ by a generally C-shaped wire 9 which extends between the rows 3 and 4 of tubes and which pushes in to hold the reinforcing channels 8 and 10 firmly in position. There is a further steel rod at the bottom of the radiator core to hold the bottom ends of the reinforcing channels 8 and 10 in position.

As can be seen clearly in Fig. 1 the reinforcing channels are provided with V cross-section ridges 11 and 12. These V-section ridges help to reinforce the channel and provide stiffness to the assembly.

Referring to Fig. 2 this shows in more detail the C-shaped wires 9 and 13 which extend between the reinforcing channels 8 and 10 to hold the assembly firmly in position. The header plates are shown at 1 and 2 in Fig. 2.

Referring to Fig. 3 this shows a cross-section of the core. The reinforcing channel members 14 and 15 are each provided with V-shaped channels such as 16, 17, 18, 19 which are positioned adjacent the external tubes 20 and 21. The corrugated airways are indicated as at 22 and 23. The C-shaped steel rods are shown as at 24 and it can be seen that the ends of the C-shaped steel rods are

positioned over the reinforcing members to hold the assembly in situ.

The arrangement of the C-shaped steel rods is shown more clearly in Fig. 4. In Fig. 4 the end 25 of the C-shaped steel rod 26 is shown extending over the edge of the reinforcing channel member 27.

As illustrated in Fig. 5, alternative ways of holding the channel members could be envisaged, such as the provision of slots 28 in the channel member 29 with enlarged heads 30 being provided on the rods such as 31.

To assemble the heat exchanger a first channel member is installed in a building rig and alternate layers of sets of tubes and airways are then applied to the first channel member. The final set of tubes is then followed by a further channel member and the assembly is compressed by means of a suitable press to permit the C-shaped steel rods, which had been previously formed to the required dimensions, to be slotted in. The press is then released and the header plates located onto the core and the assembly then baked as per normal.

The provision of the side reinforcing channels and the rods holds the core firmly in position prior to the baking operation without the need for additional jigs or clamping devices.

CLAIMS

1. A radiator core comprising a pair of opposed header plates, each header plate having disposed therebetween parallel rows of tubes extending into the header plates, a series of corrugated heat transfer airways located in the spaces between the tubes, and reinforcing members being provided at each side of the radiator core, each reinforcing member comprising a sheet of metal and being interconnected by steel rods extending between the sheets of metal.

2. A radiator core comprising a plurality of tubes spaced in substantially parallel arrangement, with the spaces between the tubes containing heat transfer surface airways, the edges of the core adjacent to the tubes each being provided with a reinforcing member, the reinforcing member comprising a sheet having a number of V cross-section channels, the apex of the channels being opposed to the core and a pair of steel rods of a general C-shape interconnecting each end of the opposed reinforcing members.

3. A radiator core as claimed in Claim 1 or Claim 2 in which each of the tubes is substantially rectangular in cross-section.

4. A radiator core as claimed in Claim 1 in which the steel rods are of generally C-shape.

5. A radiator core as claimed in Claim 4 in which each rod is located in the gaps between the rows of tubes.

6. A radiator core as hereinbefore described with reference to and as shown in Figs. 1–4 or Fig. 5 in the accompanying drawings.

7. A method of assembling a heat exchanger core comprising placing a first reinforcing member in a jig, locating on the first reinforcing member a set of rectungular cross-section tubes, locating a secondary airway surface on the set of tubes, locating further tubes and airways as required to complete the width of the core, locating a final set of tubes on the upper secondary surface, locating a secondary reinforcing member on the upper set of tubes and interconnecting the reinforcing members by means of steel rods.

8. A method as claimed in Claim 7 in which the radiator core after being assembled is baked to hold its component parts together.

9. A method of assembling a heat exchanger core as hereinbefore described with reference to the Figs. 1–4 or Fig. 5 of the accompanying drawings.

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